PATENT ABSTRACTS OF JAPAN

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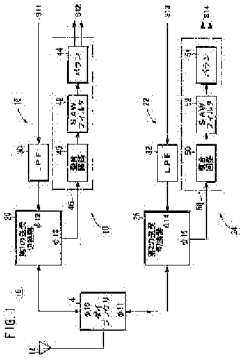
(54) TRANSMITTER/RECEIVER



(57)Abstract:
PROBLEM TO BE SOLVED: To suppress the deterioration of receiving characteristics of a signal by making available a SAW filter in the unbalanced output system of high characteristics.
SOLUTION: The device has a diplexer 14 connected to an antenna 12, a first transmitting/receiving switcher 20 connected to the diplexer 14 for switching a first transmitting system 16 and a first receiving system 18, and a second transmitting/receiving switcher 26 connected to the diplexer 14 for switching a second transmitting system 22 and a second receiving system 24. A first serial circuit 46 composed of a matching circuit 40, a SAW filter 42 in the unbalanced output system and an unbalanced/balanced converting circuit 44 is connected to the first receiving system 18, and a second serial circuit 56 composed of a matching circuit 50, a SAW filter 52 in the unbalanced output system and

an unbalanced/balanced converting circuit 54 is connected to the second receiving system 24.

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CLAIMS

[Claim(s)]

[Claim 1] The branch circuit which it connects [branch circuit] with an antenna and passes the transceiver signal of at least two kinds of frequency bands, The 1st duplexer which is connected to one input/output terminal of said branch circuit, and switches the 1st transmitting system and the 1st receiving system, Connect with the input/output

terminal of another side of said branch circuit, and it has the 2nd duplexer which switches the 2nd transmitting system and the 2nd receiving system. The transmitter-receiver characterized by connecting the series circuit by the SAW filter of an unbalanced output, and the unbalance-balance conversion circuit to said 1st and 2nd receiving systems at least, respectively.
[Claim 2] Said transmitter-receiver is a transmitter-receiver to which it is characterized by carrying out the interior of the circuit element from which it consists of electronic parts with which it is mounted in a ceramic substrate and this ceramic substrate front face at least in a transmitter-receiver according to claim 1, and said 1st duplexer and said 2nd duplexer are constituted in said ceramic substrate.
[Claim 3] It is the transmitter-receiver characterized by forming said unbalance-balance conversion circuit into said ceramic substrate in a transmitter-receiver according to claim 2.
[Claim 4] The transmitter-receiver characterized by the dielectric constant of the part which constitutes the part of said unbalance-balance conversion circuit among said ceramic substrates being 50 or more in a transmitter-receiver according to claim 3.

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* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the transmitter-receiver which can share transmission of two or more kinds of sending signals, and the input of two or more kinds of input signals with the antenna equipment of a single.
[0002]

[Description of the Prior Art] Recently, mobile communication, a cellular phone, etc. which cover the system of two frequency bands with one antenna are put in practical use. For example, in Europe, they are [in 900GSM (900MHz), 1800DCSs (1.8GHz), and the U.S.] 800PDC (800MHz) and 1900PHS (1.9GHz) at 900 D-AMPS (900MHz), 1900PCSes (1.9GHz), and Japan.

[0003] Since these two frequency bands are covered with one antenna, the transmitter-receiver 100 as shown in drawing 8 is used (for example, refer to JP,2001-211097,A).

[0004] This transmitter-receiver 100 has the diplexer 104 connected to the antenna 102, the 1st duplexer 106 which is connected to this diplexer 104 and switches transmission and reception of the signal of the 1st frequency band, and the 2nd duplexer 108 which is connected to said diplexer 104 and switches transmission and reception of the signal of the 2nd frequency band. Moreover, low pass filters 110 and 112 are connected to each transmitting side of the 1st and 2nd duplexers 106 and 108, respectively.

[0005] The sending signal S11 of the 1st frequency band is inputted into one low pass filter 110, and the sending signal S13 of the 2nd frequency band is inputted into the low pass filter 112 of another side.

[0006] SAW filter 116 of a matching circuit 114 and a balanced output method is connected to the latter part of the 1st duplexer 106, and from this SAW filter 116, the input signal S12 of the 1st frequency band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.

[0007] SAW filter 120 of a matching circuit 118 and a balanced output method is connected to the latter part of the 2nd duplexer 108, and from this SAW filter 120, the input signal S14 of the 2nd frequency band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.

[0008]

[Problem(s) to be Solved by the Invention] By the way, he is trying for SAW filters 116 and 120 connected to each receiving system to use both SAW filters 116 and 120 of a balanced output method from the need of connecting the low noise amplifier of a balanced input method to the latter part. However, generally, the SAW filter of a balanced output method has a property worse than the SAW filter of an unbalanced output method, and has a possibility that the receiving property of a signal may deteriorate.

[0009] This invention is made in consideration of such a technical problem, the SAW filter of an unbalanced output method with a sufficient

property can be used, and it aims at offering the transmitter-receiver which can control degradation of the receiving property of a signal.
[0010]
[Means for Solving the Problem] The branch circuit which the transmitter-receiver concerning this invention is connected [branch circuit] to an antenna, and passes the transceiver signal of at least two kinds of frequency bands, The 1st duplexer which is connected to one input/output terminal of said branch circuit, and switches the 1st transmitting system and the 1st receiving system, Connect with the input/output terminal of another side of said branch circuit, and it has the 2nd duplexer which switches the 2nd transmitting system and the 2nd receiving system. It is characterized by connecting the series circuit by the SAW filter of an unbalanced output, and the unbalance-balance conversion circuit to said 1st and 2nd receiving systems at least, respectively.
[0011] Thereby, the SAW filter of an unbalanced output method with a sufficient property can be used for a receiving system (the 1st and 2nd receiving systems are included), and degradation of the receiving property of a signal can be controlled.
[0012] And the interior of the circuit element which said transmitter-receiver consists of a ceramic substrate and electronic parts mounted in this ceramic substrate front face at least, and constitutes said 1st duplexer and said 2nd duplexer in said ceramic substrate may be carried out.
[0013] In this case, said unbalance-balance conversion circuit may be formed into said ceramic substrate. In this configuration, it is desirable that the dielectric constant of the part which constitutes the part of said unbalance-balance conversion circuit among said ceramic substrates is 50 or more.
[0014]
[Embodiment of the Invention] Hereafter, the example of a gestalt of operation of the transmitter-receiver concerning this invention is explained, referring to drawing 1 - drawing 7 .
[0015] One diplexer 14 which is connected to an antenna 12 and has the 1st and 2nd input/output terminals phi10 and phi11 as the transmitter-receiver 10 concerning the gestalt of this operation is shown in drawing 1 R> 1, The 1st duplexer 20 which is connected to the 1st input/output terminal phi 10 of this diplexer 14, and switches the 1st transmitting system 16 and the 1st receiving system 18, It connects with the 2nd input/output terminal phi 11 of said diplexer 14, and has the 2nd duplexer 26 which switches the 2nd transmitting system 22 and the 2nd

receiving system 24.
[0016] The sending signal S11 of the 1st frequency band (for example, 800MHz band) is inputted into the 1st transmitting system 16, and the input signal S12 of a 800MHz band is outputted from the 1st receiving system 18. Moreover, the sending signal S13 of the 2nd frequency band (for example, 1.8GHz band) is inputted into the 2nd transmitting system 22, and the input signal S14 of a 1.8GHz band is outputted from the 2nd receiving system 24.
[0017] In order to make a transmitting property good especially, the low pass filter (the 1st and 2nd low pass filters 30 and 32) is connected to the 1st and 2nd transmitting systems 16 and 22, respectively. Therefore, the sending signal S11 of said 800MHz band is inputted into the 1st low pass filter 30, and the sending signal S13 of said 1.8GHz band is inputted into the 2nd low pass filter 32.
[0018] And the 1st series circuit 46 by the matching circuit 40, SAW filter 42 of an unbalanced output method, and the unbalance-balance conversion circuit (balun) 44 is connected to the 1st receiving system 18, and from this 1st series circuit 46, the input signal S12 of a 800MHz band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.
[0019] The 2nd series circuit 56 by the matching circuit 50, SAW filter 52 of an unbalanced output method, and the unbalance-balance conversion circuit (balun) 54 is connected to the 2nd receiving system 24, and from this 2nd series circuit 56, the input signal S14 of a 1.8GHz band is outputted, and it is inputted into the low noise amplifier of the balanced input method of the latter part which is not illustrated.
[0020] Here, one example of an experiment is shown. This example of an experiment sees change of the magnitude of attenuation to the insertion loss of the SAW filter of a balanced output method, and the SAW filter of an unbalanced output method.
[0021] An experimental result is shown in drawing 2 . In this drawing 2 , the plot shown by ** and ** is the property of the SAW filter of an unbalanced output method, and the plot shown by - and 0 is the property of the SAW filter of a balanced output method. From this result, the SAW filter of the magnitude of attenuation at the time of the same insertion loss of balance system has become less than the SAW filter of an unbalance method, and it turns out on a property that the SAW filter of an unbalance method is better than the SAW filter of balance system.
[0022] Thus, in the transmitter-receiver 10 concerning the gestalt of this operation, since SAW filters 42 and 52 of an unbalanced output

method with a sufficient property can be used for the 1st and 2nd receiving systems 18 and 24, degradation of the receiving property of a signal can be controlled.

[0023] By the way, mounting of the 1st series circuit 46 or the 2nd series circuit 56 is explained, referring to drawing 3 - drawing 7 about the example of the concrete mounting technique of the 1st series circuit 46 typically, although various technique can be considered. This is the same also in the 2nd series circuit 56.

[0024] (1) As shown in drawing 3 , mount the single electronic parts 60 which have the dielectric base with which the matching circuit 40 was formed, the single electronic parts 62 which have the dielectric base with which SAW filter 42 of an unbalanced output method was formed, and the single electronic parts 64 which have the dielectric base with which the unbalance-balance conversion circuit 44 was formed for example, on a ceramic substrate 66.

[0025] (2) As shown in drawing 4 , mount the compound electronic parts 68 which have the dielectric base with which the matching circuit 40 and SAW filter 42 were formed, and the single electronic parts 64 which have the dielectric base with which the unbalance-balance conversion circuit 44 was formed on a ceramic substrate 66.

[0026] (3) As shown in drawing 5 , mount the single electronic parts 60 which have the dielectric base with which the matching circuit 40 was formed, and the compound electronic parts 70 which have the dielectric base with which SAW filter 42 and the unbalance-balance conversion circuit 44 were formed on a ceramic substrate 66.

[0027] (4) As shown in drawing 6 , mount the compound electronic parts 72 which have the dielectric base with which the matching circuit 40 and the unbalance-balance conversion circuit 44 were formed, and the single electronic parts 62 which have the dielectric base with which SAW filter 42 was formed on a ceramic substrate 66.

[0028] (5) As shown in drawing 7 , mount the compound electronic parts 74 which have the dielectric base with which the matching circuit 40, SAW filter 42, and the unbalance-balance conversion circuit 44 were formed on a ceramic substrate 66.

[0029] The technique shown in (5) among such mounting technique can constitute one receiving system (1st receiving system 18 in this case) only from mounting one compound electronic parts 74 on a ceramic substrate 66. This is the same also in the 2nd receiving system 24. Thus, component mounting becomes easy first by adopting the technique shown in (5). And since the tooth space between components can be excluded, the size of the transmitter-receiver 10 whole can be miniaturized more, and

a manufacturing cost can also be reduced.
[0030] In the various mounting technique mentioned above, it may be made to carry out the interior of the circuit element which constitutes the 1st duplexer 20 and the 2nd duplexer 26 in a ceramic substrate 66. Moreover, it may be made to carry out the interior of the unbalance-balance conversion circuit 44 (balun) into a ceramic substrate 66. Of course, also in the 2nd receiving system 24, it is the same. By adopting these configurations, the miniaturization of the size of a transmitter-receiver 10 can be attained further.
[0031] Moreover, as for the balun which is the unbalance-balance conversion circuit 44, a configuration is decided by wavelength. Therefore, in order to miniaturize a balun 44, it is desirable that the dielectric constant of the part in which a balun 44 is formed among the various dielectric bases which constitute the single electronic parts 64 and the compound electronic parts 70, 72, and 74, or a ceramic substrate 66 is 50 or more (when the interior of the balun 44 is carried out). Of course, also in the balun 54 of the 2nd receiving system 24, it is the same.
[0032] In addition, the transmitter-receiver concerning this invention of the ability of various configurations to be taken is natural, without deviating not only from the gestalt of above-mentioned operation but from the summary of this invention.
[0033]
[Effect of the Invention] As explained above, according to the transmitter-receiver concerning this invention, the SAW filter of an unbalanced output method with a sufficient property can be used, and degradation of the receiving property of a signal can be controlled.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of the transmitter-receiver concerning the gestalt of this operation.
[Drawing 2] It is the property Fig. showing change of the magnitude of attenuation to the insertion loss of the SAW filter of a balanced output method, and the SAW filter of an unbalanced output method.
[Drawing 3] It is the explanatory view showing the 1st example in the mounting technique of the 1st series circuit.
[Drawing 4] It is the explanatory view showing the 2nd example in the mounting technique of the 1st series circuit.
[Drawing 5] It is the explanatory view showing the 3rd example in the mounting technique of the 1st series circuit.
[Drawing 6] It is the explanatory view showing the 4th example in the mounting technique of the 1st series circuit.
[Drawing 7] It is the explanatory view showing the 5th example in the mounting technique of the 1st series circuit.
[Drawing 8] It is the block diagram showing the configuration of the transmitter-receiver concerning the conventional example.
[Description of Notations]
10 -- Transmitter-receiver 12 -- Antenna
14 -- Diplexer 16 -- 1st transmitting system
18 -- 1st receiving system 20 -- The 1st duplexer
22 -- 2nd transmitting system 24 -- 2nd receiving system
26 -- The 2nd duplexer
42 -- SAW filter of an unbalanced output method
44 -- Unbalance-balance conversion circuit (balun) 46 -- The 1st series circuit
50 -- Matching circuit
52 -- SAW filter of an unbalanced output method
54 -- Unbalance-balance conversion circuit (balun)
56 -- The 2nd series circuit

[Translation done.]

2.**** shows the word which can not be translated.
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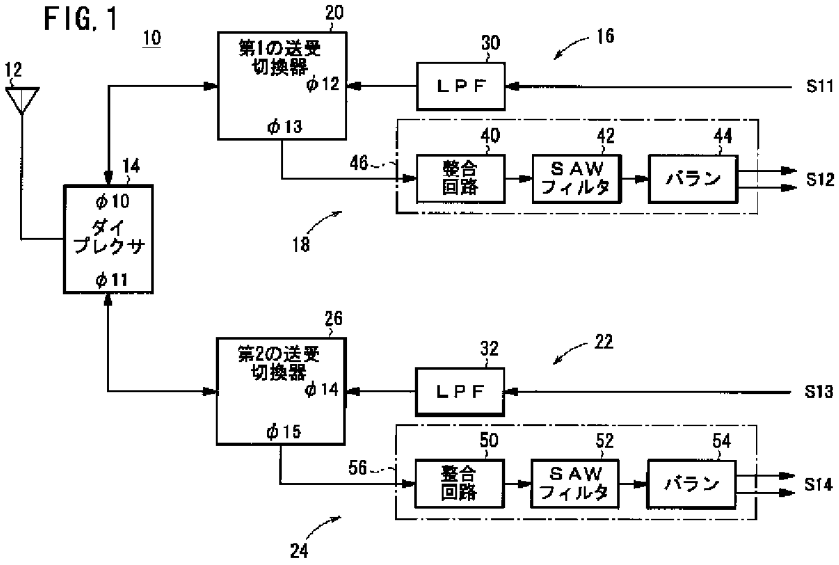
DRAWINGS

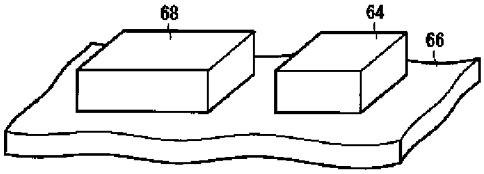
[Drawing 1]

FIG.1



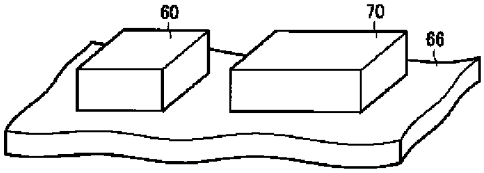
[Drawing 4]

FIG.4



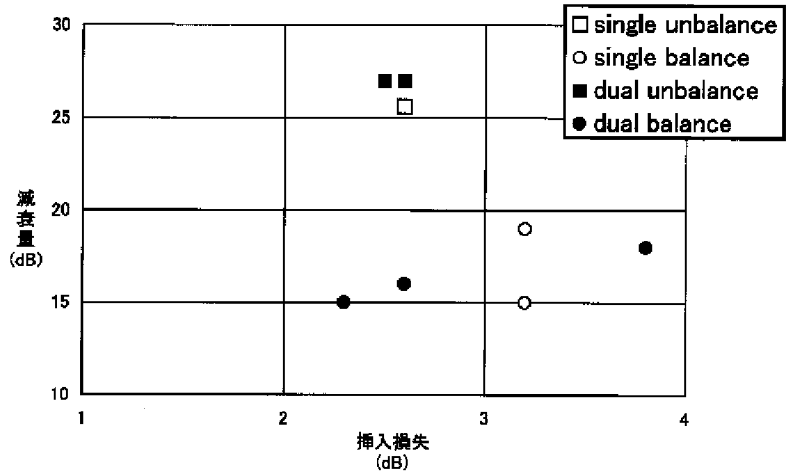
[Drawing 5]

FIG.5



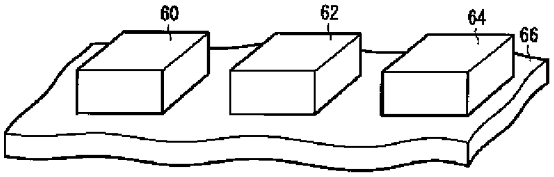
[Drawing 2]

FIG. 2



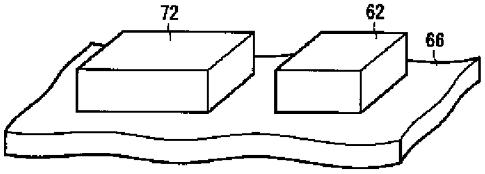
[Drawing 3]

FIG. 3



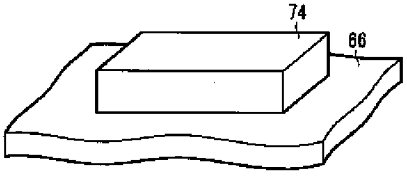
[Drawing 6]

FIG. 6



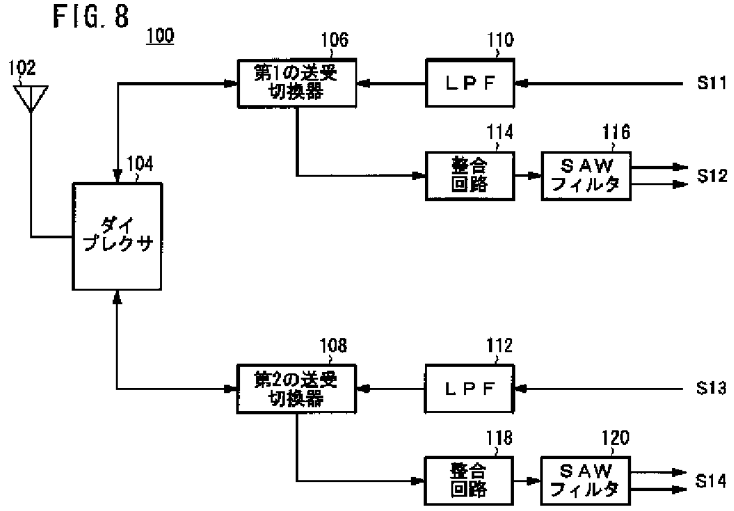
[Drawing 7]

FIG. 7



[Drawing 8]

FIG. 8



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最終頁に続く

(54)【発明の名称】　送受信装置

(57)【要約】
【課題】特性のよい不平衡出力方式のＳＡＷフィルタを使用できるようにして、信号の受信特性の劣化を抑制する。
【解決手段】アンテナ１２に接続されたダイプレクサ１４と、該ダイプレクサ１４に接続され、第１の送信系１６と第１の受信系１８とを切り換える第１の送受切換器２０と、前記ダイプレクサ１４に接続され、第２の送信系２２と第２の受信系２４とを切り換える第２の送受切換器２６とを有する。第１の受信系１８には、整合回路４０と不平衡出力方式のＳＡＷフィルタ４２と不平衡－平衡変換回路４４による第１の直列回路４６が接続され、第２の受信系２４には、整合回路５０と不平衡出力方式のＳＡＷフィルタ５２と不平衡－平衡変換回路５４による第２の直列回路５６が接続される。

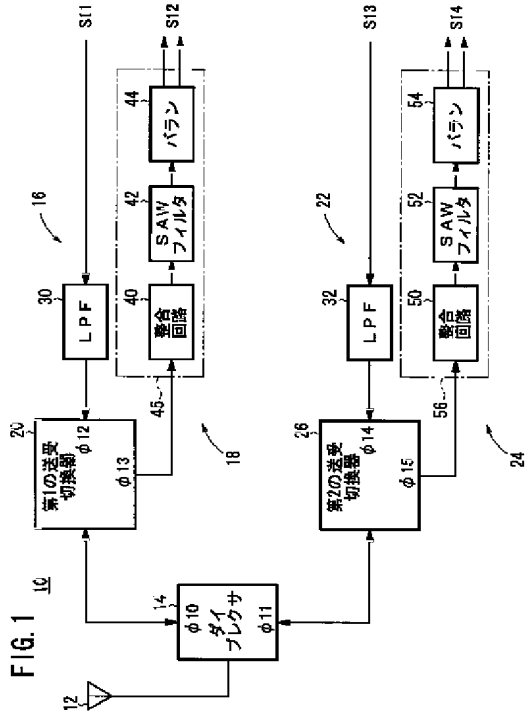


FIG. 1

【特許請求の範囲】
【請求項１】アンテナに接続され、少なくとも２種類の周波数帯の送受信信号を通過させる分波回路と、
前記分波回路の一方の入出力端子に接続され、第１の送信系と第１の受信系とを切り換える第１の送受切換器と、
前記分波回路の他方の入出力端子に接続され、第２の送信系と第２の受信系とを切り換える第２の送受切換器とを有し、
前記第１及び第２の受信系に少なくとも不平衡出力のＳＡＷフィルタと不平衡－平衡変換回路による直列回路がそれぞれ接続されていることを特徴とする送受信装置。
【請求項２】請求項１記載の送受信装置において、
前記送受信装置は、少なくともセラミック基板と、該セラミック基板表面に実装される電子部品から構成され、前記セラミック基板中に前記第１の送受切換器、前記第２の送受切換器を構成する回路素子が内装されていることを特徴とする送受信装置。
【請求項３】請求項２記載の送受信装置において、
前記不平衡－平衡変換回路は、前記セラミック基板中に形成されていることを特徴とする送受信装置。
【請求項４】請求項３記載の送受信装置において、
前記セラミック基板のうち、前記不平衡－平衡変換回路の部分を構成する部位の誘電率が５０以上であることを特徴とする送受信装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、２種類以上の送信信号の伝送と２種類以上の受信信号の入力を、例えば単一のアンテナ装置で共用することができる送受信装置に関する。
【０００２】
【従来の技術】近時、２つの周波数帯域のシステムを１つのアンテナでカバーする移動通信や携帯電話等が実用化されている。例えば、欧州では９００ＧＳＭ（９００ＭＨｚ）と１８００ＤＣＳ（１．８ＧＨｚ）、米国では９００Ｄ－ＡＭＰＳ（９００ＭＨｚ）と１９００ＰＣＳ（１．９ＧＨｚ）、日本では８００ＰＤＣ（８００ＭＨｚ）と１９００ＰＨＳ（１．９ＧＨｚ）である。
【０００３】これら２つの周波数帯域を１本のアンテナでカバーするために、図８に示すような送受信装置１００が使われている（例えば特開２００１－２１１０９７号公報参照）。
【０００４】この送受信装置１００は、アンテナ１０２に接続されたダイプレクサ１０４と、該ダイプレクサ１０４に接続され、第１の周波数帯の信号の送受信を切り換える第１の送受切換器１０６と、前記ダイプレクサ１０４に接続され、第２の周波数帯の信号の送受信を切り換える第２の送受切換器１０８とを有する。また、第１及び第２の送受切換器１０６及び１０８の各送信側には、それぞれローパスフィルタ１１０及び１１２が接続されている。
【０００５】一方のローパスフィルタ１１０には、第１の周波数帯の送信信号Ｓ１１が入力され、他方のローパスフィルタ１１２には、第２の周波数帯の送信信号Ｓ１３が入力されるようになっている。
【０００６】第１の送受切換器１０６の後段には整合回路１１４と平衡出力方式のＳＡＷフィルタ１１６が接続され、該ＳＡＷフィルタ１１６からは、第１の周波数帯の受信信号Ｓ１２が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。
【０００７】第２の送受切換器１０８の後段には整合回路１１８と平衡出力方式のＳＡＷフィルタ１２０が接続され、該ＳＡＷフィルタ１２０からは、第２の周波数帯の受信信号Ｓ１４が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。
【０００８】
【発明が解決しようとする課題】ところで、各受信系に接続されたＳＡＷフィルタ１１６及び１２０は、後段に平衡入力方式のローノイズアンプを接続させる必要から、共に平衡出力方式のＳＡＷフィルタ１１６及び１２０を使用するようにしている。しかし、平衡出力方式のＳＡＷフィルタは、一般に不平衡出力方式のＳＡＷフィルタよりも特性が悪く、信号の受信特性が劣化するおそれがある。
【０００９】本発明はこのような課題を考慮してなされたものであり、特性のよい不平衡出力方式のＳＡＷフィルタを使用することができ、信号の受信特性の劣化を抑制することができる送受信装置を提供することを目的とする。
【００１０】
【課題を解決するための手段】本発明に係る送受信装置は、アンテナに接続され、少なくとも２種類の周波数帯の送受信信号を通過させる分波回路と、前記分波回路の一方の入出力端子に接続され、第１の送信系と第１の受信系とを切り換える第１の送受切換器と、前記分波回路の他方の入出力端子に接続され、第２の送信系と第２の受信系とを切り換える第２の送受切換器とを有し、前記第１及び第２の受信系に少なくとも不平衡出力のＳＡＷフィルタと不平衡－平衡変換回路による直列回路がそれぞれ接続されていることを特徴とする。
【００１１】これにより、受信系（第１及び第２の受信系を含む）に特性のよい不平衡出力方式のＳＡＷフィルタを使用することができ、信号の受信特性の劣化を抑制することができる。
【００１２】そして、前記送受信装置は、少なくともセラミック基板と、該セラミック基板表面に実装される電子部品から構成され、前記セラミック基板中に前記第１の送受切換器、前記第２の送受切換器を構成する回路素子が内装されていてもよい。

【００１３】この場合、前記不平衡－平衡変換回路は、前記セラミック基板中に形成されていてもよい。この構成において、前記セラミック基板のうち、前記不平衡－平衡変換回路の部分を構成する部位の誘電率が５０以上であることが好ましい。

【００１４】

【発明の実施の形態】以下、本発明に係る送受信装置の実施の形態例を図１～図７を参照しながら説明する。

【００１５】本実施の形態に係る送受信装置１０は、図１に示すように、アンテナ１２に接続され、第１及び第２の入出力端子φ１０及びφ１１を有する１つのダイプレクサ１４と、該ダイプレクサ１４の第１の入出力端子φ１０に接続され、第１の送信系１６と第１の受信系１８とを切り換える第１の送受切換器２０と、前記ダイプレクサ１４の第２の入出力端子φ１１に接続され、第２の送信系２２と第２の受信系２４とを切り換える第２の送受切換器２６とを有する。

【００１６】第１の送信系１６には第１の周波数帯（例えば８００ＭＨｚ帯）の送信信号Ｓ１１が入力され、第１の受信系１８からは８００ＭＨｚ帯の受信信号Ｓ１２が出力される。また、第２の送信系２２には第２の周波数帯（例えば１．８ＧＨｚ帯）の送信信号Ｓ１３が入力され、第２の受信系２４からは１．８ＧＨｚ帯の受信信号Ｓ１４が出力される。

【００１７】特に、送信特性を良好とするために、第１及び第２の送信系１６及び２２には、それぞれローパスフィルタ（第１及び第２のローパスフィルタ３０及び３２）が接続されている。従って、第１のローパスフィルタ３０には、前記８００ＭＨｚ帯の送信信号Ｓ１１が入力され、第２のローパスフィルタ３２には、前記１．８ＧＨｚ帯の送信信号Ｓ１３が入力される。

【００１８】そして、第１の受信系１８には、整合回路４０と不平衡出力方式のＳＡＷフィルタ４２と不平衡－平衡変換回路（バラン）４４による第１の直列回路４６が接続され、該第１の直列回路４６からは、８００ＭＨｚ帯の受信信号Ｓ１２が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。

【００１９】第２の受信系２４には、整合回路５０と不平衡出力方式のＳＡＷフィルタ５２と不平衡－平衡変換回路（バラン）５４による第２の直列回路５６が接続され、該第２の直列回路５６からは、１．８ＧＨｚ帯の受信信号Ｓ１４が出力され、図示しない後段の平衡入力方式のローノイズアンプに入力される。

【００２０】ここで、１つの実験例を示す。この実験例は、平衡出力方式のＳＡＷフィルタと不平衡出力方式のＳＡＷフィルタの挿入損失に対する減衰量の変化をみたものである。

【００２１】実験結果を図２に示す。この図２において、■及び□で示すプロットが不平衡出力方式のＳＡＷフィルタの特性であり、●及び○で示すプロットが平衡出力方式のＳＡＷフィルタの特性である。この結果から、同じ挿入損失のときの減衰量は、不平衡方式のＳＡＷフィルタよりも平衡方式のＳＡＷフィルタの方が少なくなっており、特性上、不平衡方式のＳＡＷフィルタが平衡方式のＳＡＷフィルタよりも良好であることがわかる。

【００２２】このように、本実施の形態に係る送受信装置１０においては、第１及び第２の受信系１８及び２４に、特性のよい不平衡出力方式のＳＡＷフィルタ４２及び５２を使用することができることから、信号の受信特性の劣化を抑制することができる。

【００２３】ところで、第１の直列回路４６や第２の直列回路５６の実装は、様々な手法が考えられるが、代表的に第１の直列回路４６の具体的な実装手法の例について図３～図７を参照しながら説明する。これは、第２の直列回路５６においても同様である。

【００２４】（１）図３に示すように、整合回路４０が形成された誘電体基体を有する単一電子部品６０と、不平衡出力方式のＳＡＷフィルタ４２が形成された誘電体基体を有する単一電子部品６２と、不平衡－平衡変換回路４４が形成された誘電体基体を有する単一電子部品６４とを例えばセラミック基板６６上に実装する。

【００２５】（２）図４に示すように、整合回路４０及びＳＡＷフィルタ４２が形成された誘電体基体を有する複合電子部品６８と、不平衡－平衡変換回路４４が形成された誘電体基体を有する単一電子部品６４とをセラミック基板６６上に実装する。

【００２６】（３）図５に示すように、整合回路４０が形成された誘電体基体を有する単一電子部品６０と、ＳＡＷフィルタ４２及び不平衡－平衡変換回路４４が形成された誘電体基体を有する複合電子部品７０とをセラミック基板６６上に実装する。

【００２７】（４）図６に示すように、整合回路４０及び不平衡－平衡変換回路４４が形成された誘電体基体を有する複合電子部品７２と、ＳＡＷフィルタ４２が形成された誘電体基体を有する単一電子部品６２とをセラミック基板６６上に実装する。

【００２８】（５）図７に示すように、整合回路４０、ＳＡＷフィルタ４２及び不平衡－平衡変換回路４４が形成された誘電体基体を有する複合電子部品７４をセラミック基板６６上に実装する。

【００２９】これらの実装手法のうち、（５）に示す手法は、セラミック基板６６上に１つの複合電子部品７４を実装するだけで１つの受信系（この場合、第１の受信系１８）を構成することができる。これは、第２の受信系２４においても同様である。このように、（５）に示す手法を採用することにより、まず、部品実装が容易になる。しかも、部品間のスペースを省くことができるため、送受信装置１０全体のサイズをより小型化することができ、製造コストも低減することができる。

【００３０】上述した様々な実装手法において、セラミック基板６６中に、第１の送受切換器２０、第２の送受切換器２６を構成する回路素子を内装するようにしてもよい。また、セラミック基板６６中に不平衡－平衡変換回路４４（バラン）を内装するようにしてもよい。もちろん、第２の受信系２４においても同様である。これらの構成を採用することにより、送受信装置１０のサイズの小型化を更に図ることができる。

【００３１】また、不平衡－平衡変換回路４４であるバランは、波長によって形状が決まる。従って、バラン４４を小型化するためには、単一電子部品６４及び複合電子部品７０、７２及び７４を構成する各種誘電体基体やセラミック基板６６（バラン４４を内装した場合）のうち、バラン４４が形成される部分の誘電率が５０以上であることが好ましい。もちろん、第２の受信系２４のバラン５４においても同様である。

【００３２】なお、この発明に係る送受信装置は、上述の実施の形態に限らず、この発明の要旨を逸脱することなく、種々の構成を採り得ることはもちろんである。

【００３３】

【発明の効果】以上説明したように、本発明に係る送受信装置によれば、特性のよい不平衡出力方式のＳＡＷフィルタを使用することができ、信号の受信特性の劣化を抑制することができる。

【図面の簡単な説明】

【図１】本実施の形態に係る送受信装置の構成を示すブロック図である。

【図２】平衡出力方式のＳＡＷフィルタと不平衡出力方式のＳＡＷフィルタの挿入損失に対する減衰量の変化を示す特性図である。

【図３】第１の直列回路の実装手法における第１の例を示す説明図である。

【図４】第１の直列回路の実装手法における第２の例を示す説明図である。

【図５】第１の直列回路の実装手法における第３の例を示す説明図である。

【図６】第１の直列回路の実装手法における第４の例を示す説明図である。

【図７】第１の直列回路の実装手法における第５の例を示す説明図である。

【図８】従来例に係る送受信装置の構成を示すブロック図である。

【符号の説明】

１０…送受信装置　　１２…アンテナ

１４…ダイプレクサ　　１６…第１の送信系

１８…第１の受信系　　２０…第１の送受切換器

２２…第２の送信系　　２４…第２の受信系

２６…第２の送受切換器

４２…不平衡出力方式のＳＡＷフィルタ

４４…不平衡－平衡変換回路（バラン）　　４６…第１の直列回路

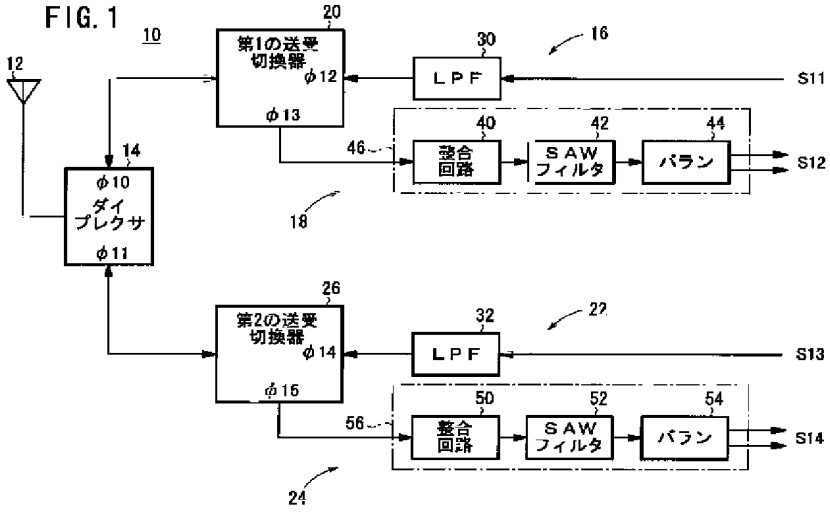
５０…整合回路

５２…不平衡出力方式のＳＡＷフィルタ

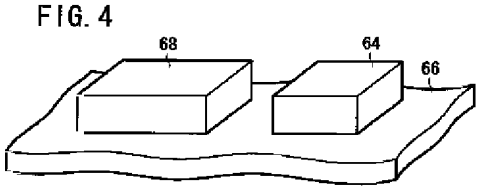
５４…不平衡－平衡変換回路（バラン）

５６…第２の直列回路

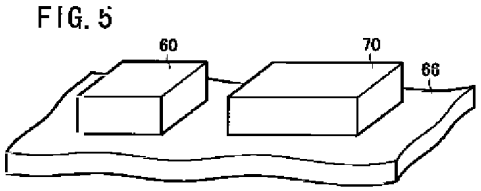
【図１】



【図４】

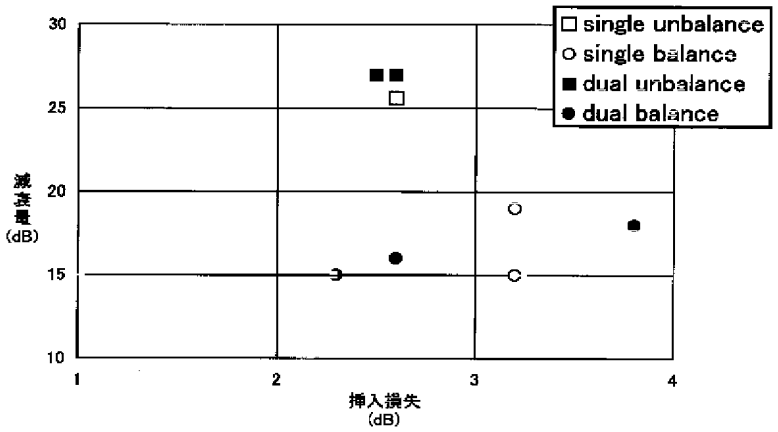


【図５】



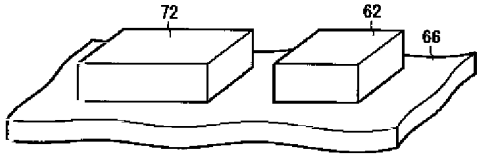
【図２】

FIG. 2



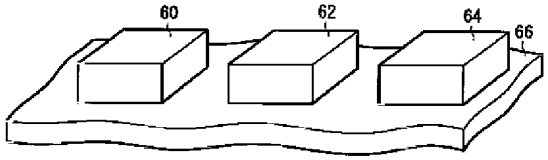
【図６】

FIG. 6



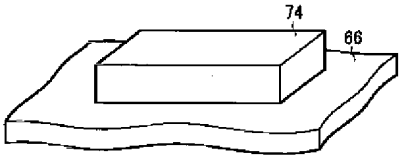
【図３】

FIG. 3



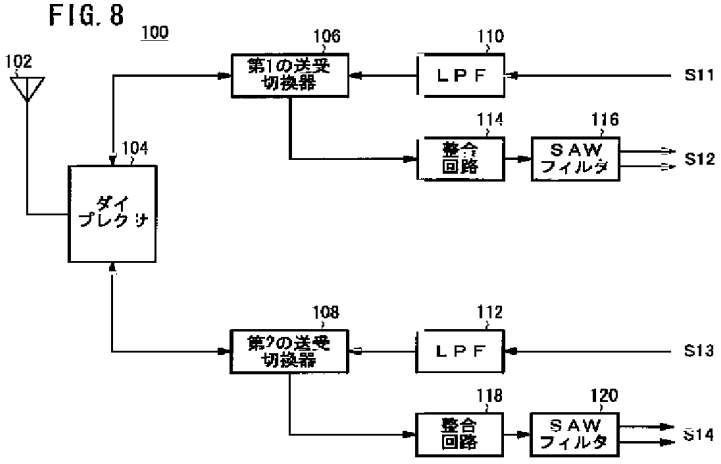
【図７】

FIG. 7



【図８】

FIG. 8



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